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EXAMINER	
SHAH, CHIRAG G	
ART UNIT	**PAPER NUMBER**
2664	

DATE MAILED: 08/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/921,999	ERIKSSON ET AL.	
	Examiner	Art Unit	
	Chirag G. Shah	2664	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 6/1/05.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-58 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-58 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 06 August 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-58 have been considered but are moot in view of the new ground(s) of rejection.

2. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-2 and 6-9 rejected under 35 U.S.C. 103(a) as being unpatentable over Paulraj et al (U.S. Patent No. 6,377,636), hereinafter Paulraj in view of Dolle et al. (U.S. Patent No. 6,674,817), hereinafter Dolle.

Referring to claim 1, Paulraj discloses in **figures 2 and 7** of a method for use in a radio communications system, comprising:

for a signal between a mobile radio **[32 of figure 2]** and a base station transceiver in a radio network **[15A,B, and C of figure 2]**, assigning a first training sequence for a first unit of information associated with the signal to be transmitted over the connection [as disclosed in col. 4, lines 2-5, where first transmitter and second transmitter [BSTs] transmit a **first signal S1** and a second signal S2 respectively both at a frequency f1. Furthermore, as disclosed in col. 4, lines 35-40, S1 and S2 are assigned a **first** and a second **training pattern** respectively. In addition, as disclosed in col. 12, lines 5-19, BST unit 72 communicates the training sequences of potential interferers and of its own signal or signals to the subscriber units within cell 52A via antennas 74]; and

assigning a second training sequence for a second unit of information associated with the signal to be transmitted over the connection between the mobile and the base station transceiver[**as disclosed in col. 4, lines 2-5**, where first transmitter and second transmitter [BSTs] transmit a first signal and **a second signal S2** respectively both at a frequency f1. Furthermore, as disclosed in col. 4, lines 35-40, S1 and S2 are assigned a first and a **second training pattern** respectively. In addition, as disclosed in col. 12, lines 5-19, BST unit 72

communicates the training sequences of potential interferers and of its own signal or signals to the subscriber units within cell 52A via antennas 74];

Paulraj fails to explicitly disclose wherein different training sequences are assigned for different units of information associated with the signal to be transmitted over the connection between the mobile radio and the base station transceiver to provide training sequence hopping for the signal transmission.

Dolle discloses in **col. 4, lines 10-30** wherein a first mobile terminal may transmit data burst of a first type including a first training sequence and a second mobile terminal may transmit data bursts of a second type including a second training sequence. This establishes wherein different training sequences are assigned for different units of information associated with the signal to be transmitted over the connection between the mobile radio and the base station transceiver providing training sequence hopping for the signal transmission.

Therefore, it would have been obvious to one of ordinary skills in the art at the time of the invention to modify the teachings of Paulraj to include the features of assigning different training sequences for different units of information associated with the signal to be transmitted between mobile and base station as taught by Dolle. One is motivated as such in order to provide a method for distinguishing between data bursts of first type transmitted from a first communication device and data bursts of a second type different form the first type transmitted from a second communication device in a digital telecommunication system *(Dolle, col. 2, lines 57-63).*

Referring to claim 2, Paulraj discloses in col. 4, lines 35 to 40 wherein the different training sequences [first and a second training pattern] are assigned for consecutive units [for S1 and S2 respectively] of information in the signal to be transmitted over the connection.

Referring to claim 6, Paulraj discloses in col. 12, lines 5-19 and in col. 11, lines 12-19of further comprising: transmitting the first training sequence [training sequence] over the connection from the base station transceiver to the mobile station [subscriber unit] along with the first unit [S1 as disclosed in col. 4, lines 35-40] of information, and the mobile station using the first training sequence in detecting the transmitted first unit [as disclosed in fig. 9 and in col. 12, lines39-51, the subscriber unit 80 has an RF/Down Conversion/Sampling circuit 84 and an interference mitigation block 86 which regularly receives channel estimates of signals of interest] as claim.

Referring to claim 7, Paulraj discloses in col. 11, lines 47-63 wherein the radio network [BSC 60] provides the base station base stations 53A,B, and C] and the mobile station [subscriber units] with a training sequence indicator [training distribution block 70 and training block 90 respectively as disclosed in figures 8 and 9], and wherein the base station uses the training sequence indicator to transmit the first training sequence [as disclosed in col. 12, lines 5-19, the training distribution block 70 in the base station receives the training sequence assignments from BSC and communicates the training sequences to the subscriber units] and the mobile station uses the training sequence indicator to provide the first training sequence in detecting the transmitted first unit [as disclosed in figure 9 and col. 12, lines 52 to col. 13, lines

10, the subscriber unit 80, having a multi-channel estimator 88 uses the training sequences from the training sequence indicator (block 90) in detecting the transmitted first unit (desired estimated channel)] as claim.

Referring to claim 8, Paulraj discloses in col. 12, lines 5-19 and in col. 4, lines 35-40 of further comprising: transmitting the first training sequence over the connection from the mobile station to the to a base station in the radio network along with the first unit of information [as disclosed in col. 12, lines 20-35 and in figure 9 and section of the specification, in the uplink direction, the situation is analogous but reversed and it is the base stations that will mitigate interference due to signals from the subscriber units; Subscriber unit 80 has its own database of training sequences 92 for transmitting training sequences over radio channel to base station. Note: Base stations are receivers and mobile stations are transmitters], and the base station using the first training sequence in detecting the transmitted first unit [as disclosed in col. 12, lines 20-35, base station receives training sequences from mobile station base based on analogous but reverse process and the base station mitigates interference due to signal from the subscriber units] as claim.

Referring to claims 9, Paulraj discloses in col. 4, lines 35-61 wherein the radio communications system is a cellular network where transmissions for different cells [Base stations in tow cells located in close proximity or even adjacent each other] are synchronized and may be distinguishable by the receiver as claim.

5. Claims 3 and 5, rejected under 35 U.S.C. 103(a) as being unpatentable over Paulraj in view Dolle as applied to claims 1-2 and 6-9 and, further in view of Balakrishnan et al (U.S. Patent No. 2003/0058926).

Referring to claim 3, Paulraj in view of Dolle fails to disclose wherein the assignment of training sequences to different units of information associated with the connection follows a cyclic pattern. Balakrishnan et al teaches in paragraph 0011 of an increase in the data rate of a multiple-input and output system that has frequency selective fading by using training sequences with both low cross-correlation, and auto-correlation. Baladrishnan discloses in paragraphs 0012-0013 of the training sequences being assigned based on cyclically shifted versions of each other. Furthermore, in the respective paragraphs, the motivation behind the assignment of such cyclic pattern is because cyclic sequences have a low normalized auto-correlation. Therefore, it would have been obvious to one of ordinary skills in the art at the time of the invention to modify the teachings of Paulraj in view of Dolle to include teaching of assigning training sequences in a cyclic pattern as taught by Balakrishnan in order to enable for receivers to separate out training sequences as mentioned in paragraph 0010.

Referring to claim 5, Balakrishnan discloses wherein the first and second training sequences are members of a training sequence se [as disclosed in claim 35], where each member has a favorable auto-correlation with other members in the set [as disclosed in 0012-0013].

6. Claims 4 rejected under 35 U.S.C. 103(a) as being unpatentable over Paulraj in view of Dolle, as applied to claims 1, 2, and 6-9, further in view of Bergkvist (U.S. Patent No. 2002/0067712).

Referring to claim 4, Paulraj in view of Dolle fails to disclose wherein the assignment of training sequences to different units of information associated with the connection follows a pseudo-random pattern. Bergkvist discloses in the abstract of a system for decorrelating background interference signals in a time-synchronized cellular system. Bergkvist further discloses 0025-0026, burst (having training sequences) associated with the connection follows a randomly selected bit pattern. Therefore, it would have been obvious to one of ordinary skills in the art at the time of the invention to modify the teachings of Paulraj in view of Dolle to include teaching of assigning training sequences in a randomized long burst pattern as taught by Bergkvist in order to increase the probability of demodulation, enabling the receivers to separate out training sequences.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 10-15, 17-22, 24-27, 30-42, 46-50 and 53-58 rejected under 35 U.S.C. 102(e) as being anticipated by Paulraj et al. (U.S. Patent No. 6377636), hereinafter Paulraj.

Referring to claims 10, 19, and 47, Paulraj discloses in figures 2 and 7 of a radio communication system comprising:

one or more base stations each including at least one base station transceiver [15A, 15B and 15C of figure 2];

a mobile radio [subscriber unit 32 in figure 2 and unit 80 of figure 9 configured to communicate with one of the base station transceivers over a radio interface [as disclosed in col. 12, lines 20-25, where in uplink communication, the subscriber units are transmitters and base stations are receivers]; and

a radio network node [BSC 60 of figure 7] configured to establish a signal connection between the base station transceiver[53A, 53B, and 53C of figure 7] and the mobile station [subscriber units operating in cells 52A, 52B and 52C as disclosed in col. 11, lines 11-15] by allocating necessary radio resources [as disclosed in figure 7 and in col. 11, lines 12-34, BSC 60 communicates the selected training sequences to base stations through a signaling block, then the base stations use these training sequences in the signals they transmit to the subscriber unit. Furthermore, BSC 60 allocates bandwidth to the training sequence used in cells to allow more precise channel estimation or to be used to increase the signal payloads of cells] and

including a training sequence controller [as disclosed in figure 7 and in col. 10, lines 64-66, BSC 60 has a training coordinator or controller 62] configured to change a training sequence used during the connection [as disclosed in col. 10, lines 64 to col. 11, lines 19, controller 62 is connected to database of training patterns 64 and the controller may configure to change or re-use different structures between base station and subscribers and cellular layouts while taking into account the changing interference scenarios].

Referring to claim 11, Paulraj discloses in figure 6 and in col. 10, lines 23-40 wherein the cellular radio communications network further employs time division multiple access [TDMA] and frequency hopping [the TDMA system employs a more aggressive frequency re-use schedule, in particular, the available spectrum is subdivided into only 3 subchannels f1, f2, and f3, which are re-used in three sectors of each cell 52 as shown] as claim.

Referring to claim 12, Paulraj discloses in col. 10, lines 64-66 of a BSC 60, which has a training controller 62 connected to a database of training patterns 64. Paulraj further discloses in col. 11, lines 35-45, of a training controller 62 that assigns a training sequence hopping pattern to the connection as claim. Paulraj further discloses including a training sequence controller [as disclosed in figure 7 and in col. 10, lines 64-66, BSC 60 has a training coordinator or controller 62] configured to change or generate different training sequences used during the signal connection between base station and mobile radio [as disclosed in col. 10, lines 64 to col. 11, lines 19, controller 62 is connected to database of training patterns 64 and the controller may configure to change or re-use different structures between base station and subscribers and cellular layouts while taking into account the changing interference scenarios].

Referring to claims 13, 34, 40 and 56, Paulraj discloses in figure 7 and in col. 10, lines 64-66 wherein including a sequence of table lookup addresses [a database of training patterns connected to a training controller 62] corresponding to the training sequence hopping pattern for the connection [as further disclosed in col. 10, lines 63 to col. 11, lines 11, the training

coordinator makes assignments and re-assignments for the connection based on set of training patterns in database 64] as claim.

Referring to claims 14, 20, 26, 36, 49 and 58, Paulraj discloses in col. 11, lines 38-42 wherein the training sequence controller 62 includes a training sequence hopping pattern generator[controller 62 assigns long training sequence] configured to generate a training sequence hopping pattern for the connection using one or more parameter [as disclosed in col. 8, lines 44-62], wherein the pattern indicated how the training sequence is to be changed during the connection [as disclosed in col. 10, lines 64 to col. 11, lines 11, controller 62 is connected to database of training patterns 64 and the controller may configure to change or re-use different structures and cellular layouts while taking into account the changing interference scenarios] as claim.

Referring to claims 15, 27, 33, 41, 42, 50 and 55, Paulraj discloses in col. 8, lines 42-62 wherein one or more training sequence parameters include one a number of training sequences as claim.

Referring to claims 17, 18, and 39, wherein the electronic circuitry is configured to process a first training sequence indicator for the first time interval in the signal transmission in order to generate the first training sequence a second training sequence indicator for the second time interval in the connection in order to generate the second training sequence. [as disclosed in figure 8 and col. 12, lines 5-19, and base station 53A has a training distribution block for

receiving a first training sequence indicator and second training sequence for first and second time interval [Guard intervals, G1,G2,...,Gy as disclosed in col. 9, lines 37-48] and

Referring to claims 21, 31 and 54, Paulraj discloses in figure 7 and in col. 12, lines 5-19 of wherein the radio network node [BSC 60] is configured to provide the training sequence hopping pattern to the base station and to the mobile station as claim.

Referring to claims 22 and 32, Paulraj discloses in col. 12, lines 5-19 and in figure 7 wherein the radio network node [BSC 60] is configured to provide the training sequence hopping pattern to the base station and to the mobile station. Paulraj further discloses that BSC provides along with training sequences the information pertaining to radio resources allocated for the connection during a connection set up-procedure [as disclosed in figure 7 and in col. 11, lines 12-34, BSC 60 communicates the selected training sequences to base stations through a signaling block, then the base stations use these training sequences in the signals they transmit to the subscriber unit. Furthermore, BSC 60 allocates bandwidth to the training sequence used in cells to allow more precise channel estimation or to be used to increase the signal payloads of cells] as claim.

Referring to claim 24, Paulraj discloses in figures 2 and 71 of wherein the system is a GSM type cellular radio system, where the radio network node is either a base station controller or a mobile switching center as claim.

Referring to claim 25, Paulraj discloses in figure 7 of a radio network node [BSC 60] for use in a cellular communications network comprising:

a resource controller configured to determine resources to support a connection between a base station and a mobile station [as disclosed in figure 7 and in col. 11, lines 12-34, BSC 60 communicates the selected training sequences to base stations through a signaling block, then the base stations use these training sequences in the signals they transmit to the subscriber unit. Furthermore, BSC 60 allocates bandwidth (via training controller) to the training sequence used in cells to allow more precise channel estimation or to be used to increase the signal payloads of cells], and training sequence hopping controller [training controller 62] configured to determine a training sequence hopping pattern for the connection [as disclosed in col. 10, lines 64-66 of a BSC 60, which has a training controller 62 connected to a database of training patterns 64. Paulraj further discloses in col. 11, lines 35-45, of a training controller 62 that assigns a training sequence hopping pattern to the connection]. Paulraj further discloses including a training sequence controller [as disclosed in figure 7 and in col. 10, lines 64-66, BSC 60 has a training coordinator or controller 62] configured to change or generate different training sequences used during the signal connection between base station and mobile radio [as disclosed in col. 10, lines 64 to col. 11, lines 19, controller 62 is connected to database of training patterns 64 and the controller may configure to change or re-use different structures between base station and subscribers and cellular layouts while taking into account the changing interference scenarios].

Referring to claims 35 and 57, Paulraj discloses in col. 8, lines 59 to col. 9, lines 15 wherein each training sequence pattern includes an associated identifier[frequency tone], and

wherein the indication[guard interval] includes one of the training sequence hopping pattern identifier as claim.

Referring to claim 37, Paulraj discloses in figure 7 of a training coordinator 62 for use in a radio node [as disclosed in col. 11, lines 12-16, BSC 60 communicates the selected training sequences to base stations], comprising: electronic circuitry configured to perform the following tasks:

provide a first training sequence corresponding to a first time interval in a signal transmission between a base station transceiver in a radio network and a mobile station [as disclosed in col. 4, lines 35-39, S1 and S2 are assigned a first and a second training pattern; Furthermore as disclosed in col. 9, lines 29 to col. 10, lines 3, signals S2 and S3 have been assigned respective training patterns, and S2, S3...Sy may be broken up into guard intervals, training sequences and payload, because the time of flight of Sy is longest, Sy is transmitted first at T0. Guard intervals ensure that training sequences are available to mobile unit simultaneously. Thus, as disclosed in col. 11, lines 12-19, BSC 60, which has a training coordinator 60, communicates the selected training sequences such as S2 to base stations and the base stations then use **the training sequences, S2 and guard intervals, G2** in the signals they transmit to subscriber units] and provide a second training sequence corresponding to a second time interval in a signal transmission between a radio network and a mobile station [as disclosed in col. 4, lines 35-39, S1 and S2 are assigned a first and a second training pattern; Furthermore as disclosed in col. 9, lines 29 to col. 10, lines 3, signals S2 and S3 have been assigned respective training patterns, and S2, S3...Sy may be broken up into guard intervals, training sequences and

payload, because the time of flight of Sy is longest, Sy is transmitted first at T0. Guard intervals ensure that training sequences are available to mobile unit simultaneously. Thus, as disclosed in col. 11, lines 12-19, BSC 60, which has a training coordinator 60, communicates the selected training sequences such as S2 to base stations and the base stations then use **the training sequences, S3 and guard intervals, G3** in the signals they transmit to subscriber units].

Referring to claim 38, Paulraj discloses in col. 4, lines 35-40 and col. 12, lines 5-19 of the first and second training sequence. Paulraj discloses in col. 11, lines 38-46 that long training sequence may be used to estimate a characteristic of a radio channel supporting the connection signal transmission as claim.

Referring to claim 48, Paulraj discloses in figure 2 of mobile radio terminal [subscriber unit 32] configured to communicate with a cellular communications network [network 11], comprising:

processing and transceiving circuitry configured to communicate information with the cellular communications network over a radio-based connection [As disclosed in figure 2, unit 32 communicates to Base stations 15A, 15B, and 15C. The receiver 32 is able to coherently receive S1, S2 and S2], and

a training sequence hopping controller [as disclosed in figure 7 and in col. 10, lines 64-66, BSC 60 has a training coordinator or controller 62] configured to determine a training sequence hopping pattern for the connection [[as disclosed in col. 10, lines 64 to col. 11, lines 11, controller 62 is connected to database of training patterns 64 and the controller may configure to

change or re-use different structures and cellular layouts while taking into account the changing interference scenarios] as claim.

Paulraj further discloses including a training sequence controller [as disclosed in figure 7 and in col. 10, lines 64-66, BSC 60 has a training coordinator or controller 62] configured to change or generate different training sequences used during the signal connection between base station and mobile radio [as disclosed in col. 10, lines 64 to col. 11, lines 19, controller 62 is connected to database of training patterns 64 and the controller may configure to change or re-use different structures between base station and subscribers and cellular layouts while taking into account the changing interference scenarios].

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 16, 28, 43 and 51 rejected under 35 U.S.C. 103(a) as being unpatentable over Paulraj in view of Dogan et al. (U.S. Pub. No. 2002/0150182).

Referring to claims 16, 28, 43 and 51, Paulraj fails to disclose of generating an offset training sequence hopping pattern from the training sequence hopping pattern assigned to the connection. Dogan teaches in the abstract of a method that performs spatial processing, timing estimation and frequency offset using a training sequence of a received burst. Thus, a second

signal channel signal is generated from the training sequence/burst hopping pattern assigned to the connection. Therefore, it would have been obvious to one of ordinary skills in the art at the time of the invention to modify the teachings of Paulraj to include teaching of generating offset as taught by Dogan in order to accurately determine the timing or delay and frequency offset based on analyzing a long training sequence across a potentially long delay spread.

11. Claim 23 rejected under 35 U.S.C. 103(a) as being unpatentable over Paulraj in view of Suonvieri et al. (U.S. Patent No. 6,373,833).

Referring to claim 23, Paulraj fails to disclose wherein the radio network node is configured to provide the training sequence hopping pattern to a new base station in conjunction with a handover of the connection to the new base station. Suonvieri discloses in col. 2, lines 18-46, figure 8 and in col. 9, lines 7-55 that in handover situations when the mobile station movies to a new cell, the access burst includes a training sequence of a total of 87 bits. Therefore, it would have been obvious to one of ordinary skills in the art at the time of the invention to modify the teachings of Paulraj to include teachings as taught by Suonvieri so that eh handover between the nodes is made possible so that the traffic time slot used by the base station remains the same as before the handover.

12. Claims 29, 44, 45 and 52 rejected under 35 U.S.C. 103(a) as being unpatentable over Paulraj in view of Balakrishnan et al (U.S. Patent No. 2003/0058926).

Referring to claims 29, 45 and 52, Paulraj fails to disclose wherein the assignment of training sequences to different units of information associated with the connection follows a

cyclic pattern. Balakrishnan et al teaches in paragraph 0011 of an increase in the data rate of a multiple-input and output system that has frequency selective fading by using training sequences with both low cross-correlation, and auto-correlation. Baladrishnan discloses in paragraphs 0012-0013 of the training sequences being assigned based on cyclically shifted versions of each other. Furthermore, in the respective paragraphs, the motivation behind the assignment of such cyclic pattern is because cyclic sequences have a low normalized auto-correlation. Therefore, it would have been obvious to one of ordinary skills in the art at the time of the invention to modify the teachings of Paulraj to include teaching of assigning training sequences in a cyclic pattern as taught by Balakrishnan in order to enable for receivers to separate out training sequences as mentioned in paragraph 0010.

Referring to claims 44, Balakrishnan discloses wherein the first and second training sequences are members of a training sequence se [as disclosed in claim 35]t, where each member has a favorable auto-correlation with other members in the set [as disclosed in 0012-0013].

13. Claims 31, 46, and 53 rejected under 35 U.S.C. 103(a) as being unpatentable over Paulraj in view of Bergkvist (U.S. Patent No. 2002/0067712).

Referring to claim 31, 46, and 53, Paulraj fails to disclose wherein the assignment of training sequences to different units of information associated with the connection follows a pseudo-random pattern. Bergkvist discloses in the abstract of a system for decorrelating background interference signals in a time-synchronized cellular system. Bergkvist further discloses 0025-0026, burst (having training sequences) associated with the connection follows a randomly selected bit pattern. Therefore, it would have been obvious to one of ordinary skills in

the art at the time of the invention to modify the teachings of Paulraj to include teaching of assigning training sequences in a randomized long burst pattern as taught by Bergkvist in order to increase the probability of demodulation, enabling the receivers to separate out training sequences.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chirag G. Shah whose telephone number is 571-272-3144. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wellington Chin can be reached on 571-272-3134. The fax phone number for the organization where this application or proceeding is assigned is 571-272-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

cgs
August 18, 2005

Ajit Patel
Primary Examiner